Sample NRCS
Integrated Pest Management
Conservation Activity Plan

Activity Code No. 114

Draft prepared by the IPM Institute with support from
the North Central and Northeastern IPM Centers – 01/18/10

Client Information

Name: _____

Address: _____

City: _____

St. _____ zip _____

Phone: _____

Acres covered in plan: _____

Technical Service Provider Information

Name: _____

Address: _____

City: _____

St. _____ zip _____

Phone: _____

Client Signature: _____ Date: _____

TSP Signature: _____ Date: _____

NRCS Acceptance: _____ Date: _____

The IPM Institute of North America, Inc.

North Central IPM Center

Northeastern IPM Center

Background and Site Information

Operator Information

Operator name: _____

Farm number: _____

Tract number: _____

Crop rotation: _____

Site Overview, History and General Management

The 160 acre farm and including 22 acres of orchards is located in Rice County Minnesota. The property has a mix of orchard blocks, crop land, hay/pasture land and mixed hardwoods. A stream is present on the property and a site that was believed to be a winter encampment used by Native Americans adds unique historical and cultural value to the parcel.

The orchard is managed for wholesale production and retail sales are minimal. The grower works directly with the wholesaler for additional assistance in production management. Apples are of mixed varieties (Cortland, Delicious, Empire, Fireside, Golden Delicious, Haralson, Honeycrisp, Macintosh and Zestar) and are grown for fresh wholesale market and processing. Apple pests are managed with minimal tolerance of fruit and leaf diseases (scab) and direct fruit feeding insects (plum curculio, codling moth and apple maggot). Indirect apple pests (European red mite, spotted tentiform leafminer, etc.) are kept below damage levels that would adversely affect fruit finish, size and other fruit quality parameters. There is very low tolerance for damage to apples.

The farm was purchased by the current operator in 1995, efforts began to re-plant and re-vitalize the existing 40 acre orchard began in 1996. When purchased, the orchard had been abandoned for at least ten years and little is known about the previous operator of the orchard. The sellers of the property did not engage in operating or maintaining existing orchard blocks and used the property for its vacation/recreational value. Lack of general orchard maintenance by the previous owners required a majority of the orchard be re-planted. Three acres of old standard size trees are all that remain of the original orchard. Remaining acreage was either replanted with fruit trees or taken out of tree fruit production and renovated for field crop production. Current aerial photography shows the location of these abandoned blocks, which are now in field crop production. Records describing general orchard maintenance and pest management practices are not available to the present owner/operator. The long period of abandonment of the orchard reduces concerns for pesticide resistance relating to pest management practices of the original orchard operator.

Resource Concerns

This conservation plan considers whole farm systems planning to identify management strategies and mitigation practices to resource concerns relating to Integrated Pest Management (IPM) and other activities.

Field blocks: one, two, three and five:

- Surface water runoff from pesticides and fertilizers
- Ground water leaching of pesticides.
- Soil erosion, i.e. sheet, rill and gully erosion.
- Invasive species control on agricultural land.
- Habitat concerning
- Beneficial insects and pollinators.

Field blocks four and six:

- Invasive species control on agricultural land.
- Habitat concerning upland game and small mammals.

All non-agricultural lands on farmstead:

- Cultural resources present on property.
- Invasive species control on non-agricultural land.
- Habitat concerning upland game, migratory fowl and small mammals.

History of Pest Management Activity

The grower is in transition between a conventional calendar spray program and IPM. Strategies to use organophosphate alternatives for control of primary pests have been implemented since the operator began managing the orchard. The use of azinphos-methyl (Guthion) was eliminated in 2007 and phosmet (Imidan) is the only organophosphate presently used. The incorporation of other IPM strategies has been slow. In 2006 the grower began monitoring for codling moth with pheromone baited traps. This is the only pest the grower had been monitoring and pest management decisions were not based on trap counts. In 2009 the grower began utilizing pest scouting services which provided monitoring and scouting of a wider range of apple pests. Management decisions were not made on available pest data and primary reliance for pest control was on a calendar spray schedule. Degree days are recorded from the local newspaper, but no onsite weather station exists to provide site specific degree day data or leaf wetness data for insect and disease forecasting.

Orchard Maps and Descriptions
Refer to the attached maps. Included on the maps are roads, surface waters and soil types. The following maps are included:

1. NRCS soils map
2. Orchard maps

The aerial map is marked with the locations of insect traps, wells and pesticide storage and mixing areas and surface waters. The Soils Map Unit Description contains an abbreviated description of the predominant soil types.

Tract: Legal Description: 2342
Township: 110 N Range: 21 W Sections: 19 & 20

Field No. 1	Acreage: 7.1	Primary Soils: See map
Field No. 2	Acreage: 11.5	Primary Soils: See map
Field No. 3	Acreage: 3.5	Primary Soils: See map
Field No.4	Acreage: 14	Primary Soils: See map
Field No. 5	Acreage: 20	Primary Soils: See map
Field No. 6	Acreage 3.5	Primary Soils: See map

Field Acreage: 59.6

Total Acreage: 160

Environmental Risk Assessment:
Soils Description

- The primary soils of this orchard are the 106C2, 106D2 and 106 E Lester loam, which are well drained loamy soils with high available water capacity. These soils are on a six to 12 percent slope and 12 to 18 percent slope. Therefore, there is concern that steeper portions of this soil type are potentially highly erodible and make surface transport of pesticides possible. The perennial fruit trees and between-row vegetation both mitigates soil erosion and surface transport. These soils are part of the "B and D" soil sub-group on the WIN-PST mitigation table.

- 1362B, Angus loam is present in the center orchard block. This soil on a two to five percent slope, is well drained and has a moderately high to high capacity for surface transport. The perennial fruit trees and between-row vegetation both mitigates soil erosion and surface transport of pesticides, therefore there is little concern for soil erosion

and surface transport of pesticides. These soils are part of the "B" soil sub-group on the WIN-PST mitigation table.

- Another common soil type in the orchard is the 114 Glencoe clay loam, a poorly drained clay soil with high available water capacity. This soil is situated on a zero to one percent slope, with little concern for soil erosion and surface transport of pesticides. These soils are part of the "B" subsoil group on the WIN-PST mitigation table.

- Minimal soil erosion is present in fields used for agricultural purposes. Concern should be taken to mitigate high levels of rill and gully erosion present on roads and pathways used to access the orchard and other parts of the property. The access road leading from the farmstead to access the back orchards crosses a stream. Erosion is present on the road and provides a source of sediment loading into the stream. Engineered mitigation should be implemented to stabilize these access roads and prevent further soil erosion.

Land Use and Description

- The farm is divided into two 80 acre parcels located diagonally between a paved county road. The 80 acre parcel to the north consists of a mix of wooded land, pasture, crop land and orchards. A stream is also present on the property. The orchard blocks are located on the southern 80 acre parcel and are divided into three distinct blocks that are separated and bordered by woods, hay/pastureland and crop land and surface waters.

- The farm is bordered by conventional farmland on all sides of the property. A wood lot is present on the south east corner of the most southern orchard block and a wooded area with a stream separates the northern and center orchard blocks. The stream enters the northwest corner of the property and flows in a south east direction. The location where the stream passes between the northern orchard block and the center orchard block is protected by approximately 4.5 acres of dense wooded cover. The northern edge of the center orchard block and the southern edge of the north orchard block slope towards the stream. The stream exits the property to the east and runs south along the eastern property line and diverges away from the property at the south east corner. On the property a culvert exists over the stream to provide the grower access to the south and center orchard blocks. The grower uses this road and culvert to access the apple crop when applying pesticides.

- The south-east corner of the property contains a wood lot that is believed to be the site of a Native American camp. This site is several acres in size and is adjacent to the stream present on the property. This portion of the property is managed for its natural aesthetic value and no plans exist for logging, timber stand improvement or any other management practices that would change the present landscape. A full environmental assessment of this cultural resource is required for future management of the parcel.

- A mix of vegetation including open unmanaged fields, pasture land, wooded areas, orchards and streams is home to many common mammals, birds, fish and other aquatic life found in south-eastern Minnesota. Wildlife is seen in abundance on the property and proper measures should be taken to improve habitat for these commonly found species. No critical habitat for any endangered or threatened species is present on the parcel.

- Vegetation present along the borders between fields, orchards and woods provides habitat for beneficial and predatory insects that are of value to the orchards IPM system. Proper mitigation should be used to prevent off-target drift from contaminating these field edges and boarders. Additional mitigation should be implemented to improve the diversity of this habitat.

Management Practices

- The following pesticides were applied to the orchard blocks (field one, two, three and five) in 2009: phosmet (Imidan), captan (Captan), metiram (Polyram), trifloxystrobin (Flint), fenpropathrin (Danitol), thiophanate (Topsin M), acetamiprid (Assail), glyphosate (Roundup), 2, 4-D, paraquat (Gramoxone), carbaryl (Sevin) and prohexadione (Apogee). The WIN-PST Hazard Rating table included in this plan rates the hazard of each of these compounds to surface and groundwater.

- Orchard alleys are mowed several times during the growing season. 100% of the trees are pruned on an annual basis in the dormant season.

- Rootstocks used on fruit tree varieties are: M7, M111 and M9. The remaining block from the original orchard is on standard root stocks. These semi-dwarfing root stocks are susceptible to fire blight, shoot blight and blossom blast/blight. The grower has not encountered these problems in the past.

- The seven acre north orchard block is the only irrigated block. This irrigation system consists of a drip system that applies water directly to the soil surface within the drip zone of the fruit trees. The water source for the irrigation system is the well that also provides potable water and other water for the home and general operations of the farm. Overhead irrigation is not used on any of the orchard blocks.

- An additional 40 acres is rented out for field crops (35 acres) and hay production (five acres). The acreage for field crop production is located in between the center and southern orchard blocks and on the adjacent 80 acre parcel located to the north. Borders and buffers between these two fields are minimal and field crops are a potential off-target drift area for the orchard. The proximity of the orchard to these fields makes the orchard a potential site for off-target drift for the field crop producer. These acres are managed by a separate operator(s) and pesticide mixing, storage, and container disposal is

performed off site. Equipment and implements, i.e. tractors sprayers, cultivators, harvesters enter the property from access points that do not cross the surface waters present on the property.

Pesticide Resistance Concerns/Management:

1. Orchard has a history of trifloxystrobin use against apple scab fungus (*Venturia inequalis*), which in several apple growing regions of the United States has become resistant to one or more classes of fungicide, including the strobilurin trifloxystrobin. It is important to reduce any strobilurin fungicide use to a minimum to decrease the chances of pesticide resistance.

2. Orchard has a history of organophosphate use for control of codling moth and apple maggots. These two species have become resistant to this class of pesticides in many apple production regions of the United States.

   An endemic codling moth population will require more frequent applications of insecticide than would otherwise be necessary. One goal should be to minimize the area of the orchard receiving these extra insecticide applications through the placement of additional codling moth traps throughout the orchard. Monitoring of all pest and beneficial species is to be continued throughout, to build the necessary database for eventual insecticide and fungicide reductions.

3. Glyphosate is used to control weeds present in the orchard rows. Application of glyphosate and other herbicides are typically performed as spot treatments with a backpack sprayer or a boom-sprayer. The grower uses glyphosate very minimally and alternates with other herbicide chemistries. The grower should be cautioned to use weed management practices that will not select for herbicide resistance and should consider incorporating other cultural and mechanical controls to control weeds in the orchard.

Monitoring Guidelines

Pest History

While the primary diseases and insect pests in the table below have not been present at damaging levels during the last growing season. Conducive conditions for these primary pests exist and control strategies should be implemented. Monitoring will focus on the primary pests. Less rigorous monitoring and observation for the secondary pests will also be conducted. Variability in weather and crop development can lead to variability in pest occurrence with some needing regular yearly control.

Insect & Diseases - The following table presents both disease and insect pests of apple that are to be monitored and managed.

Crop	Insect	Disease
Apple	Level I Plum Curculio Codling Moth Apple Maggot European Red Mite Spotted Tentiform Leafminer Level II Green Fruit Worm Red-Banded Leafroller Rosy Apple Aphids Obliquebanded Leafroller Japanese Beetle	Level I Apple Scab Level II Fire Blight Powdery Mildew Flyspeck-Sooty Blotch

Pest Scouting, Monitoring and Control Strategies

- Specific strategies and protocol for monitoring and control are outlined in the "Integrated Pest Management Manual for Minnesota Apple Orchards", which the grower has or will purchase from the Minnesota Depart of Agriculture. This manual identifies IPM priorities (i.e., reducing unnecessary pesticide applications, focusing on pest control, alternatives to organophosphates, etc.), and gives the reader scouting and management tips for specific pests.

- Perform pest scouting based on University Extension recommendations and available pest bulletins.

- Monitoring needs to consist of routine pest scouting that documents: date of scouting, pest population/degree of infestation, fields/crop scouted and overall fruit tree health.

- Purchase a weather station and locate it in the orchard. The weather station needs to be able to record the following data: high and low temperature, growing degree days and leaf-wetness hours. Additional weather monitoring features that are beneficial include a rain gauge and a wind-vain that records wind speed and direction. Data from the weather station should be used to determine the presence of apple scab infection periods, growing degree days can be used to determine and/or predict insect emergence and wind speed and direction can help to appropriately time spray applications to minimize pesticide drift.

- The primary goal for the grower is to utilize monitoring data to guide pesticide applications.

- Grower should continue to transition from broad spectrum insecticides to reduced-risk chemistries.

- Grower should encourage, monitor and utilize beneficial insects for control of secondary pests such as mites, leafminers and aphids.

- Tissue analysis and proper fertilization to maintain the health of the apple trees and to help resist disease and insect pressure should be done in consultation with the pest consultant.

- Annual pruning is encouraged to open up the canopy, speed drying to suppress disease development and improve pesticide penetration and coverage.

- Once leaf drop has occurred, leaf litter should be mowed in the fall to reduce apple scab inoculums and leafminers the following spring.

- Use Minnesota Apple Scab Hotline to determine ascospore maturity. Call: (952) 652-6052.

2010 Pest Management Priorities

1. Scout for plum curculio, codling moth, apple maggot, spotted tentiform leafminer, and European red mites.

2. Scout for obliquebanded leafroller, redbanded leafroller, rosy apple aphids and other secondary insect pests as necessary.

3. Improve pest trapping and recording of data from traps.

4. Record all pesticide applications and pest monitoring data.

5. Record temperature and wetting hours with a weather station to determine when infection periods have occurred for apple scab and calculate degree days for arthropod pests.

6. Calibrate the sprayer.

7. Eliminate one or two applications of Imidan (phosmet) unless justified by pest monitoring data.

8. Reduce use of any strobilurin fungicide to a minimum in 2010 to reduce chances of scab resistance.
    a. Alternatively, eliminate leaf litter in the fall to prevent scab (e.g. through mow/fine-leaf-chop the leaf litter in fall after leaf drop or in spring, broadcast lime under the tree rows after leaf drop in fall, or apply urea after leaf drop in fall or in spring).

9. Presently low levels of codling moth justify using mating disruptions for codling moth to reduce pesticide dependency.

10. Discuss with IPM Consultant the trapping and spot-spray options for Japanese Beetle management.

11. If entire orchard is not pruned annually, keep pruning records and/or provide map of pruning locations to keep track which trees were pruned each year.

12. Implement one or both of these practices to increase habitat for beneficial insects:
    a. Every other row mowing;
    b. Plant an annual/perennial forbs mix wherever possible (within rows, in orchard alleys or as borders); the ultimate goal is to have a nectar source every 120 feet in every direction.

Conservation Plan

Mitigation Practices to Reduce Environmental Risk

Based upon the environmental assessment of the property the following mitigation practices should be installed to address environmental concerns relating to water resource management, pesticide loading in surface and ground waters and protection of habitat for wildlife and important beneficial insects and pollinators. Mitigation practices relate directly to the IPM needs for the orchard blocks.

Fields one, two, three and five:

- Field border (386): strips of permanent vegetation located along edges of orchard blocks or located within the block will offer mitigation to slow down surface transport of pesticides and create habitat for beneficial insects and pollinators. Primary emphasis should be on created habitat for beneficial insects and native pollinators.

- Filter strip (393): orchard areas that drain directly to adjacent surface waters (areas with a slope of 1% or greater), filter strips will prevent soil erosion and prevent pollution from nutrients, sediment and agricultural chemical runoff. This can be applied on the south and west borders of field one; north border of field two.

- Mulching (484): when reasonable, this practice may be applied within the orchard rows to help minimize the need for herbicide use and prevent soil erosion.

Field two, three and five:

- Irrigation system, micro irrigation (441): this practice should be applied if additional irrigation systems are to be installed on the two orchard blocks that are presently not irrigated.

Field four and six:

- Herbaceous weed control (315): this may be applied to hay/pastureland and non-wooded land out of agricultural production

- Early Successional Habitat Development/Management (647): this standard should be implemented to help guide habitat development and forest succession on non-agricultural lands present on the parcel. This will help increase the overall ecological biodiversity of the property.

Remaining non-agricultural lands and farmstead:

- Forest Stand Improvement (666): this standard may be applied to facilitate forest stand regeneration, improve understory aesthetics, wildlife habitat or recreation.

- Access Road (560): engineered improvements to access roads on the property should be implemented according to this standard to minimize soil erosion and sediment loading in the stream present on the property. This is particularly important where the access road crosses a stream between fields one and five.

- Agrichemical Handling Facility (702): engineered improvements to the pesticide mixing/loading and storage facility should be performed to reduce pollution of soil, ground water, surface water and to provide a safe environment for individuals mixing and loading agrichemicals.

Pesticide Storage, Mixing and Container Disposal

- Pesticide products are stored in a locked storage shed, which is used exclusively for pesticide storage. Product is purchased as needed; large volumes are not stored onsite. Currently the well is upgrade from the mixing area by 450 to 500 feet. Pesticide mixing is performed on a gravel pad. Prior to the 2010 growing season, the grower will make sure the mixing site meets Minnesota and Federal NRCS standards.

- Pesticides (excluding herbicides) are applied with a 300 gallon PTO-driven air-blast sprayer. Applications are not made when conditions are favorable for wind drift and/or rain-induced wash-off. Concentrate applications are applied at an approximate rate of 50 gallons to the acre to reduce pesticide movement from the leaves to the groundcover.

- Empty pesticide containers are triple-rinsed and disposed of at a county dump/recycling facility.

Emergency Action Plan and RE-Entry Interval (REI) Tracking

- Pest management product labels and Material Safety Data Sheets (MSDS) sheets are not currently kept on file, the grower will begin keeping these on file with commencement of the 2010 growing season.

- Emergency contact and Poison Control Center numbers are not posted where pesticides are stored. Grower will post proper numbers in pesticide storage shed prior to the 2010 growing season.

- The grower currently does not have a portable pesticide exposure decontamination kit. This kit should be assembled before the 2010 growing season and be located in the pesticide storage area and/or mixing areas. The kit must contain:

    1. 3 – 1-gal. potable water containers.
    2. 2 – 16-oz. bottles of emergency eyewash solution.
    3. 1 – 3-oz. container of antibacterial hand and body soap.
    4. 4 – extra-larger disposable towels.
    5. 1 – limited-use coverall for change of clothes.

- A shower for pesticide decontamination is located in the workshop adjacent to the pesticide storage shed and mixing pad.

- Paper copies of application records are located in the grower's home office.

Implementation Records

Pesticide application records are kept and referred to annually for pesticide selection and rotation. Pesticide application records are also compiled provided to the wholesaler during pack-out. Pesticide application records must contain the following:

- Orchard blocks where pesticides were applied.

- Reference to scouting data that supports application of pesticide.

- When and where special IPM techniques were implemented to mitigate site-specific risks. These techniques include: reduced-rate pesticide applications; alternate row spraying; substitution of high-risk pesticides for reduced-risk pesticides and spot or partial block treatments.

Additional Comments:

- USDA Good Agricultural Practice (GAP) program: since wholesale of fruit provides a majority of on-farm income, the grower should inquire with their wholesale buyer about implementation of the GAP program on their farm. This program targets many issues relating to food safety, including pesticide use and residues. GAP could impact IPM on the farm, requiring the grower to modify their IPM strategies to comply with GAP standards.

Attachments:

- Environmental Evaluation (EE) (CPA 52)
- WIN-PST mitigation table
- NRCS soils map
- Conservation map one
- Conservation map two

Additional Resources:

1. "Rinsing Pesticide Containers," Minnesota Extension Service, AG-FS-3771.
2. Minnesota Department of Natural Resources, "Nature Snap Shots", http://www.dnr.state.mn.us/snapshots/index.html [Resources on common wildlife species found in Minnesota, including range and habitat].
3. North Central Fruit IPM Evaluation Tool, http://www.ipm.msu.edu/work-group/home.htm [IPM evaluation tool for tree fruit IPM].
4. McCamant, T. 2007. Integrated Pest Management Manual for Minnesota Apple Orchards. Minnesota Department of Agriculture, Minnesota Fruit and Vegetable Growers Association & USDA-Risk Management Agency. Ed.2.
5. Fadamiro, H. 2003 Field Guide for Identification of Pest Insects, Diseases and Beneficial Organisms in Minnesota Apple Orchards, Minnesota Department of Agriculture.

EQIP IPM Conservation Activity Plan

Mitigation - 2010

All of the pesticides used in this orchard that are listed with Hazard Ratings pose at least an intermediate threat to Surface Water in some part of the orchard. While groundwater risk is of low concern, the high risk to surface water requires the implementation of one or more mitigation techniques, as listed in the table below.

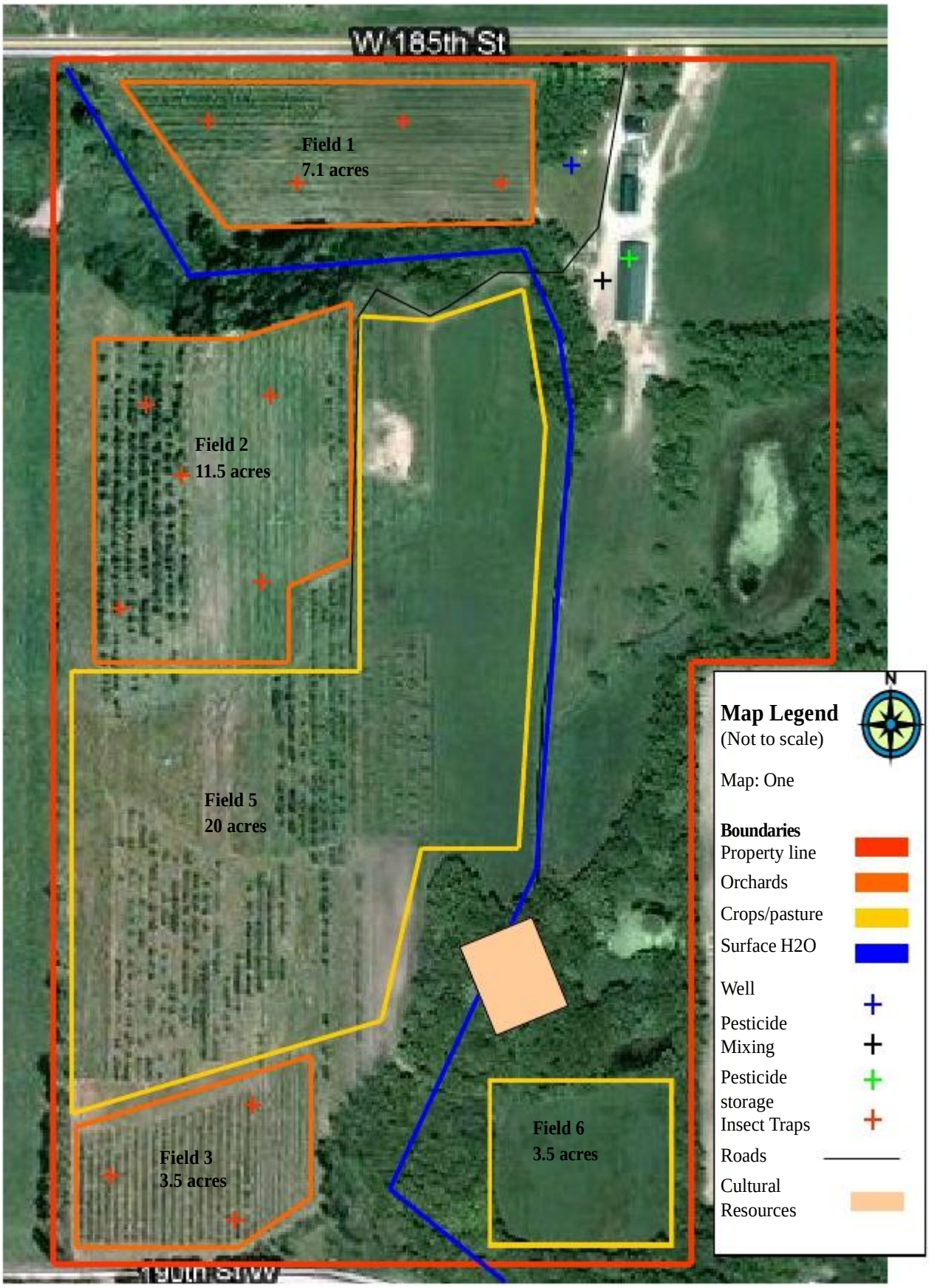
The Hazard Rating Quick Reference Table results are reiterated below, followed by the mitigation measures employed to reduce the probability of environmental contamination. The Conservation Practices listed are historical practices employed to reduce runoff and soil loss. The management techniques listed have the special emphasis of the included EQIP Pest Management Plan.

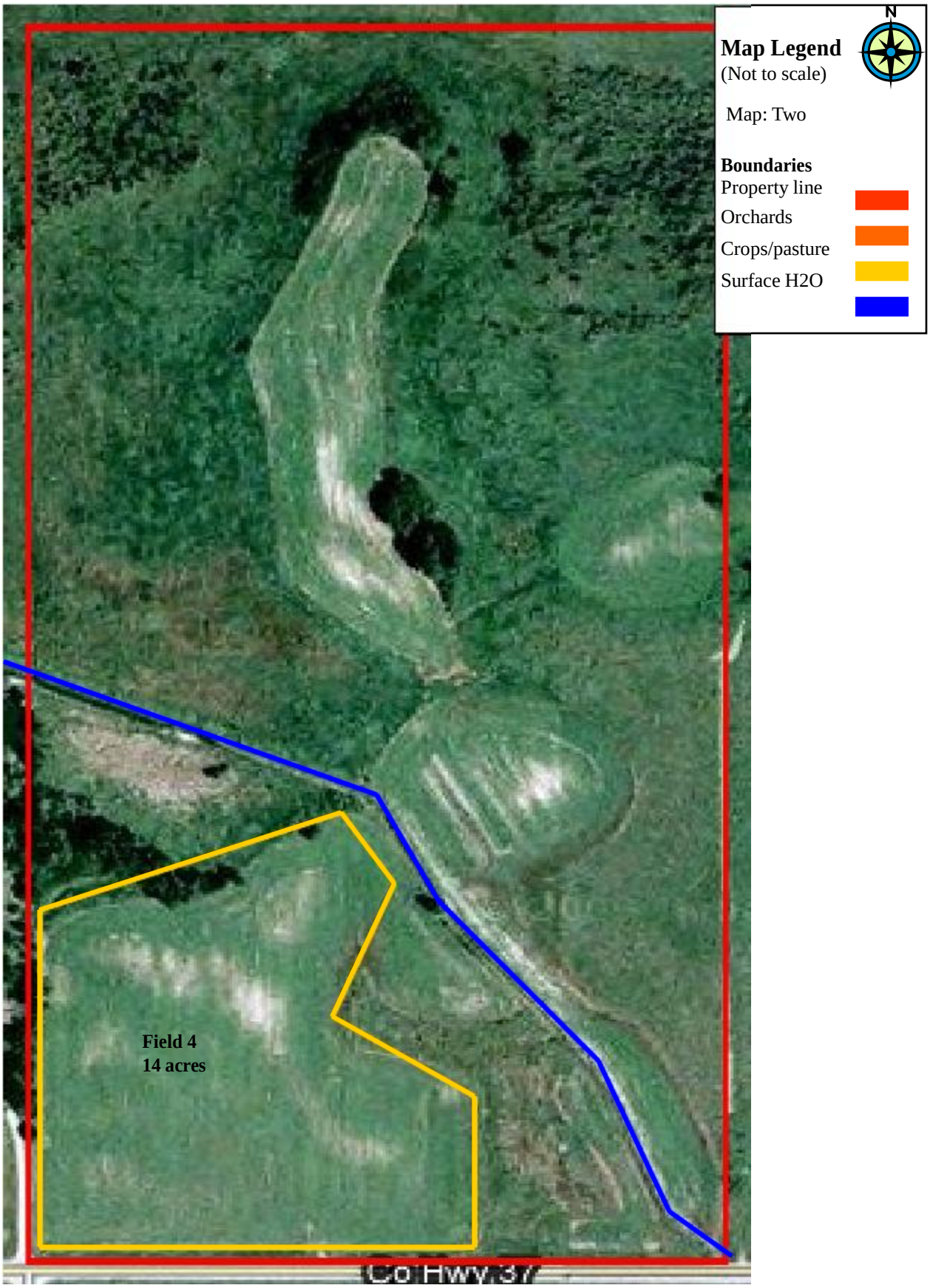
Pesticide		**Pesticide Ratings per Subsoil**		**Pesticide Ratings per Subsoil**		**Mitigation Techniques Employed**							
Active Ingredient	**Trade Name**	**"B"**		**"D"**		**Management Technique**				**Conservation Practices**			
		Ground-water	Surface Water	Ground-water	Surface Water	Low Rate	Partial Treatment	Scouting	Substi-tution	330	386	393	600
acetamiprid	Assail	V	V	V	V			Y			Y	Y	
fenpropathrin	Danitol	V	**H-X**	V	**H-X**			Y			Y	Y	
phosmet	Imidan	L	**I-H**	L-**I**	**I-H**	Y		Y			Y	Y	
carbaryl	Sevin	L	**I**	L-**I**	**I**						Y	Y	
captan	Captan	V	L-**I**	V	L-**I**			Y			Y	Y	
metiram	Polyram	L	**I-H**	L-**I**	**I-H**			Y			Y	Y	
trifloxystrobin	Flint	V	**I-H**	V	**I-H**			Y			Y	Y	
thiophanate	Topsin	V	**I-H**	L	**I-H**			Y			Y	Y	
Glyphosate	Round up	V	L	V	L		Y				Y	Y	
2-4-D	Various	L	L	L	L						Y	Y	
paraquat	Gramaxone	L	I-H	L-I	I-H						Y	Y	

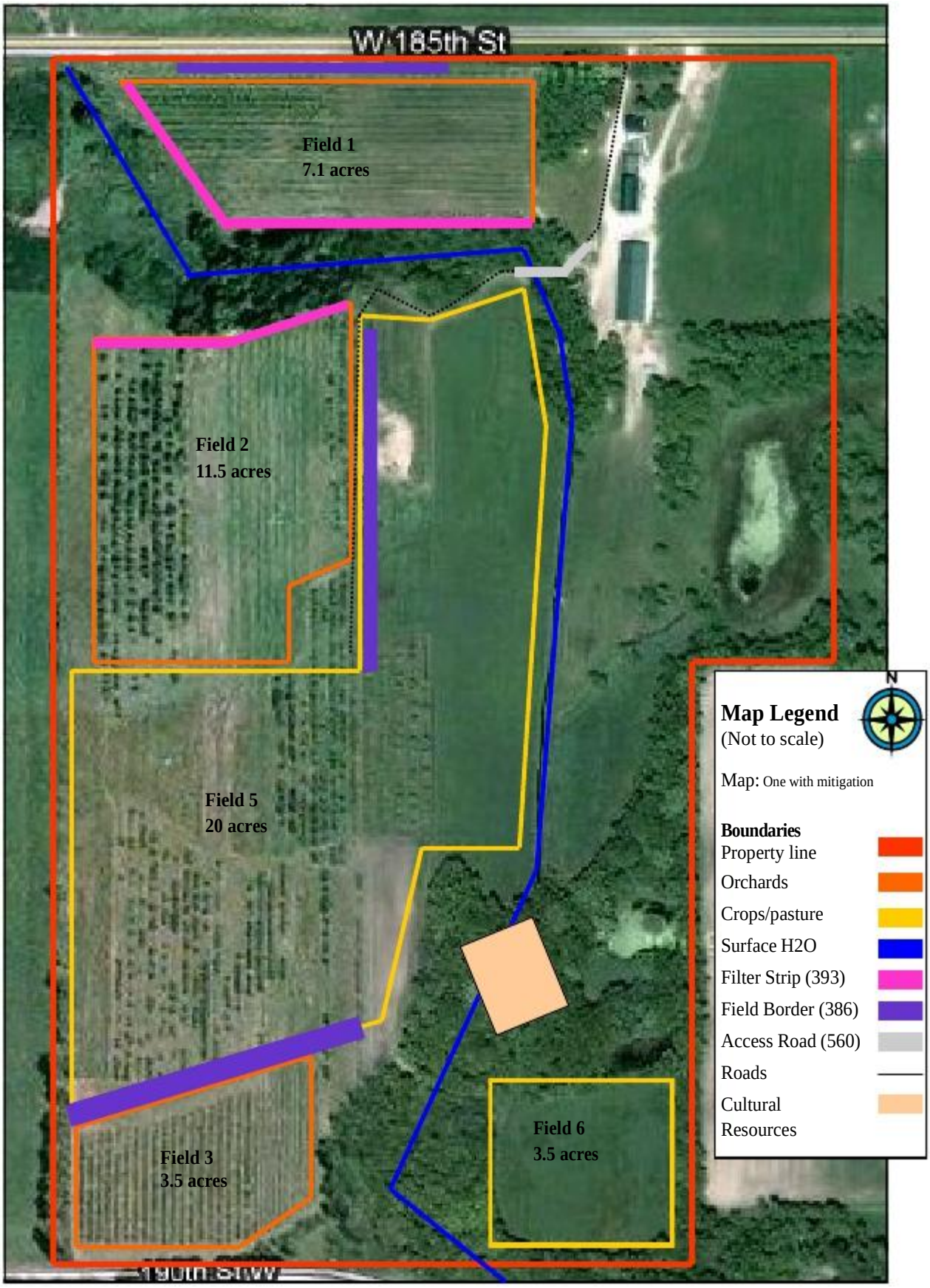
V-Very Low
L-Low
I-Intermediate
H-High
X-Extra High

Y-Technique employed

E-Eligible for Practice


W 185th St
Field 1
7.1 acres
Field 2
11.5 acres
Field 5
20 acres
Field 3
3.5 acres
Field 6
3.5 acres
N
Map Legend
(Not to scale)
Map: One
Boundaries
Property line
Orchards
Crops/pasture
Surface H2O
Well
Pesticide Mixing
Pesticide storage
Insect Traps
Roads
Cultural Resources


Map Legend
(Not to scale)
N
Map: Two
Boundaries
Property line
Orchards
Crops/pasture
Surface H2O
Field 4
14 acres
Co Hwy 37


W 185th St
Field 1
7.1 acres
Field 2
11.5 acres
Field 5
20 acres
Field 3
3.5 acres
Field 6
3.5 acres
190th St W
N
Map Legend
(Not to scale)
Map: One with mitigation
Boundaries
Property line
Orchards
Crops/pasture
Surface H2O
Filter Strip (393)
Field Border (386)
Access Road (560)
Roads
Cultural Resources

SOILS MAP

Date: 1/7/2010

N

Customer(s): [redacted]
District: RICE SOIL & WATER CONSERVATION DISTRICT
Legal Description: [redacted]

Field Office: FARIBAULT SERVICE CENTER
Agency: NRCS
Assisted By: [redacted]
Land Units: Tract: [redacted]
State and County: MN, RICE